

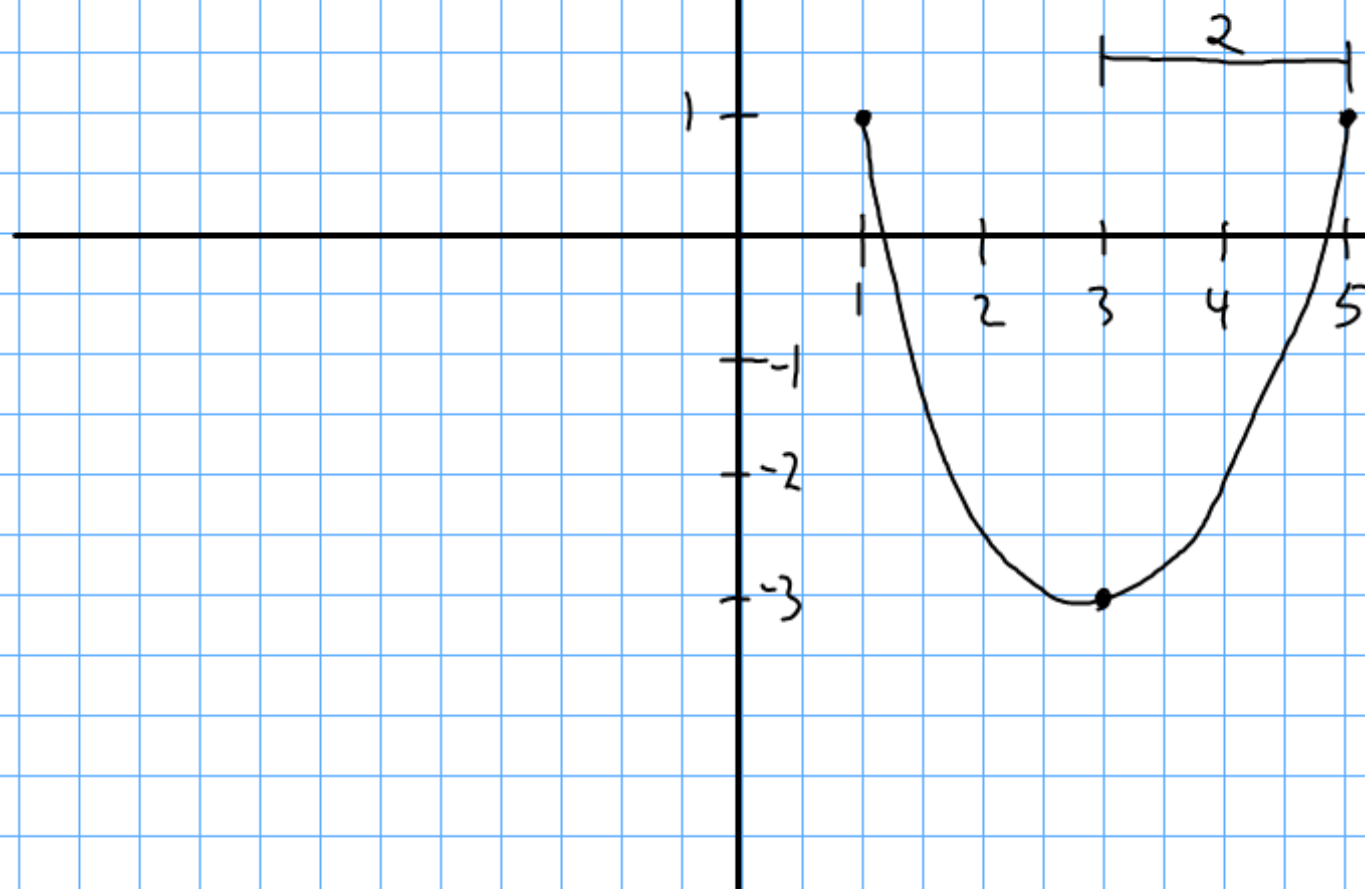
$$\underline{y} = \sqrt{1 - (x+3)^2} - 2$$

$$\underline{\underline{f(x)}} = \sqrt{1 - (x+3)^2} - 2$$

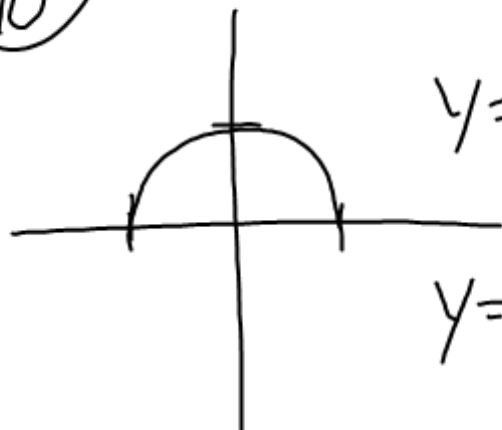
$$y = -4\sqrt{1 - \left(\frac{x}{2} - 1.5\right)^2} + 1$$

$$y = -4\sqrt{1 - \left(\frac{x-3}{2}\right)^2} + 1$$

$$y = -2\sqrt{4 - (x-3)^2} + 1$$



10



$$y = \sqrt{1 - x^2}$$

$$y = \frac{1}{2} \sqrt{1 - x^2}$$



$$y = \sqrt{1 - \left(\frac{x}{\frac{1}{2}}\right)^2}$$



$$y = \frac{1}{2} \sqrt{1 - \left(\frac{x}{\frac{1}{2}}\right)^2}$$

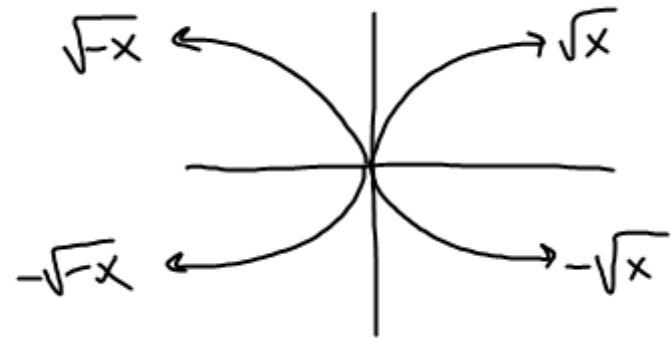


Quadratic / parabola

general Equation  $y = \pm a(x-h)^2 + k$

Square root

general Equation  $y = \pm a\sqrt{\pm(x-h)} + k$

Absolute Value

general Equation  $y = \pm a|x-h| + k$

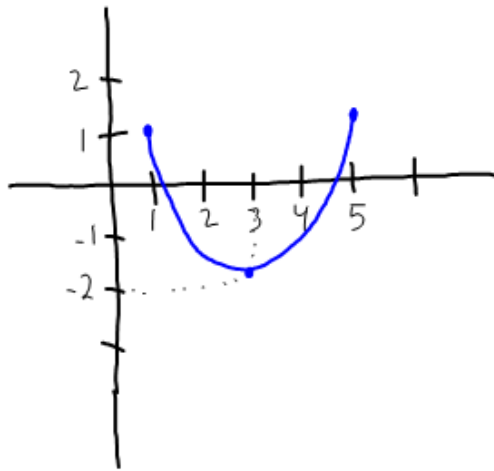
Semi-circle

general Equation  $y = \pm a\sqrt{1 - \left(\frac{x-h}{c}\right)^2} + k$

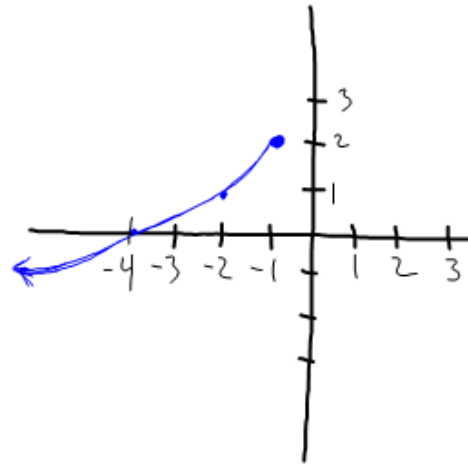
Quiz

- ① Solve for  $y$  in  $(y-3)^2 - 1 = x + 5$  and sketch a graph. Find the domain and range.
- ② Solve  $f(x) = -2(x-5)^2 - 1$  for  $x$  if  $f(x) = -33$
- ③ Find the equations for the graphs below:

(a)



(b)



$$(y-3)^2 - 1 = x + 5$$

+1                  +1

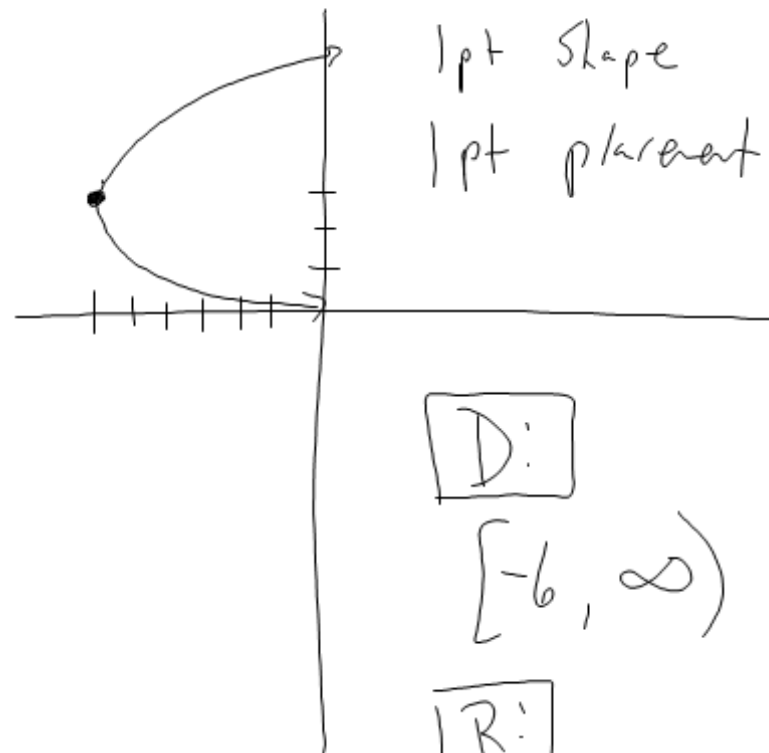
$$\sqrt{(y-3)^2} = x + 6$$

$$y-3 = \pm \sqrt{x+6}$$

+3                  +3

1 pt  $y = \textcircled{\pm} \sqrt{x+6} + 3$

-0.5                  +3



1 pt slope

1 pt placement

D:

$[-6, \infty)$  0.5

R:

$(-\infty, \infty)$  0.5

Solve  $f(x) = -2(x-5)^2 - 1$  for  $x$  if  $f(x) = -33$

$$\begin{array}{r} -33 = -2(x-5)^2 - 1 \\ +1 \end{array}$$

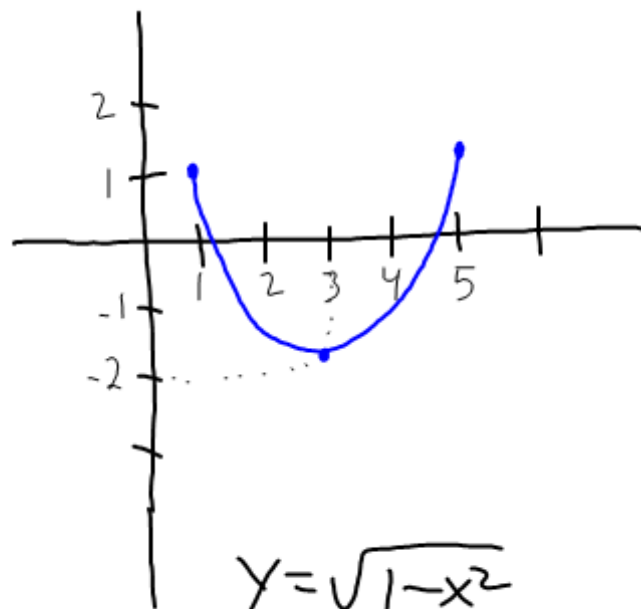
$$\begin{array}{r} -32 = -2(x-5)^2 \\ \underline{-2} \quad \underline{-2} \end{array}$$

$$\begin{array}{r} \sqrt{16} = \sqrt{(x-5)^2} \\ \pm 4 = x-5 \\ +5 \quad +5 \end{array}$$

$$x = 9, 1 \quad (2 \text{ pts})$$

③ Find the equations for the graphs below:

①



$$y = \sqrt{1-x^2}$$

$$y = -3\sqrt{1-x^2}$$

$$y = -3\sqrt{1 - \left(\frac{x-3}{2}\right)^2} + 1$$

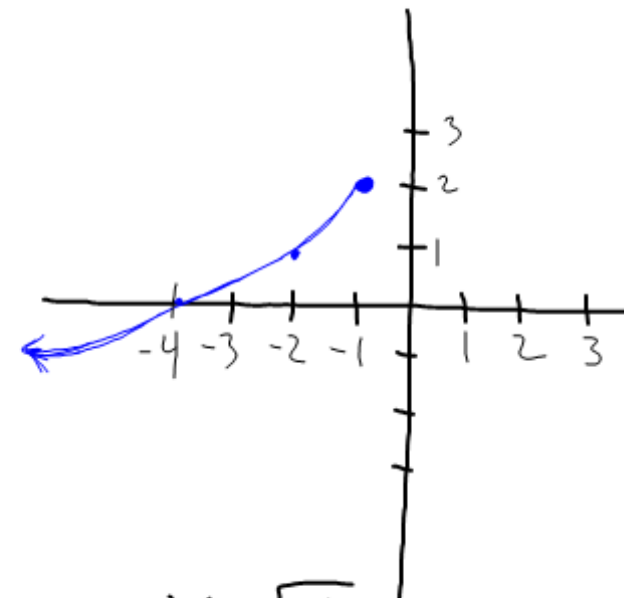
0.5

0.5

0.5

basic  
equation  
0.5

②



$$y = \sqrt{x}$$

$$y = -\sqrt{-x}$$

$$y = -\sqrt{-x-1} + 2$$

0.5

$$-\sqrt{-(x+1)} + 2$$



Example 1

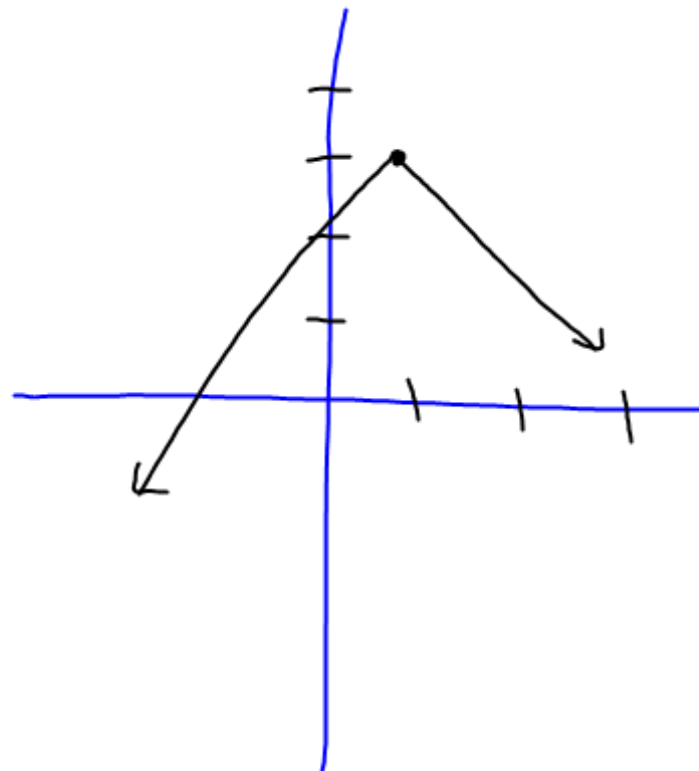
$$y = -|x - 1| + 3$$

Diagram illustrating the components of the function  $y = -|x - 1| + 3$ :

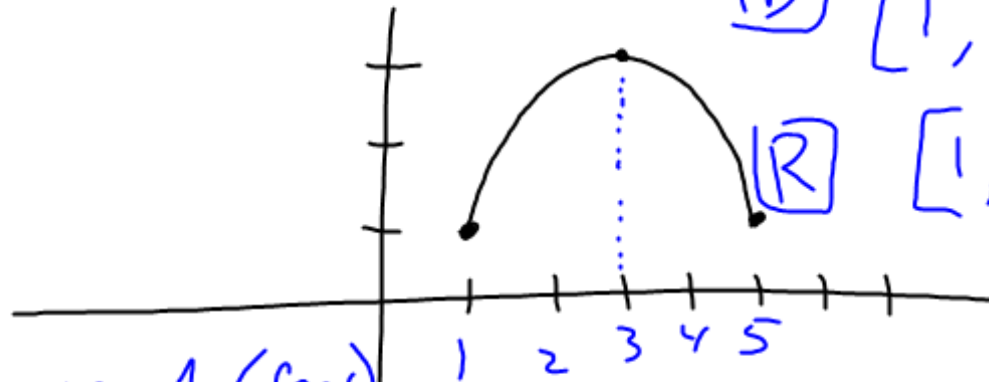
- The negative sign indicates a reflection across the x-axis.
- The  $|x - 1|$  term indicates a horizontal shift (move) of 1 unit to the right.
- The  $+3$  term indicates a vertical shift (up) of 3 units.

Domain  
 $(-\infty, \infty)$

Range  
 $(-\infty, 3]$

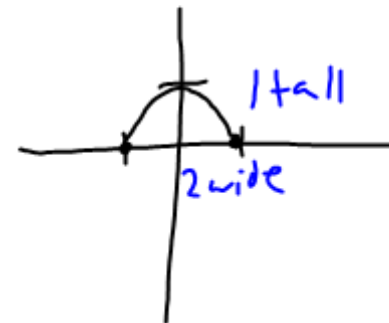


Example 2

 $\boxed{D} [1, 5]$  $\boxed{R} [1, 3]$ 

move up 1 (feet)

move right 3 (middle)

stretch 2 tall  
4 wide

$$y = \sqrt{1 - x^2}$$

$$y = 2 \sqrt{1 - \left( \frac{x-3}{2} \right)^2} + 1$$

height

width  
bigger  
b/2

$r+3$

Ex. 3

$$y = \sqrt{x}$$

$$y-2 = \sqrt{x} \quad +2$$

$$y = \sqrt{x} + 2$$

~~$$\frac{y}{2} = \sqrt{x}$$~~

$$y = 2\sqrt{x}$$

$$y = \sqrt{x}$$

$$y = \sqrt{x-2} \quad +2$$

$$y = \sqrt{1-x^2}$$

$$y = \sqrt{1-\left(\frac{x}{2}\right)^2}$$

stretch  
horizontally

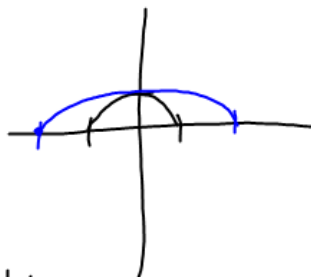
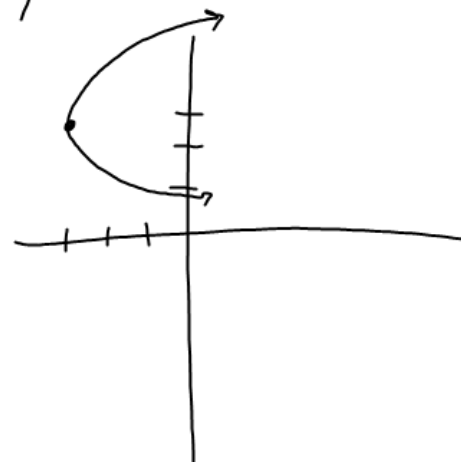
$$(y-3)^2 - 1 = x + 2$$

+1                      +1

$$\sqrt{(y-3)^2} = x + 3$$

$$y-3 = \pm \sqrt{x+3} \quad +3$$

$$y = \pm \sqrt{x+3} + 3$$

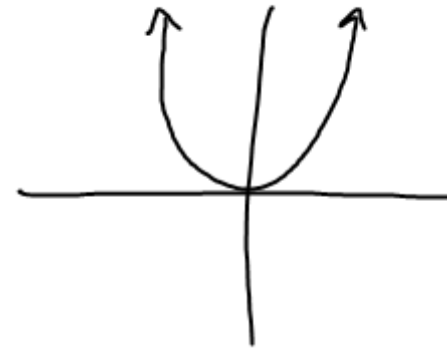


HW

Study for next Quiz

# Quadratic

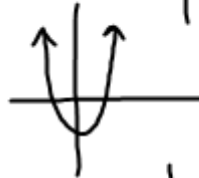
general Equation  $y = \pm a(x-h)^2 + k$



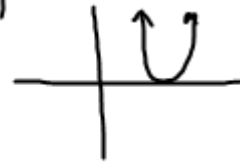
move up 3  $y = x^2 + 3$



move down 3  $y = x^2 - 3$



move right  $y = (x-3)^2$



move left  $y = (x+3)^2$



reflect over  
x-axis

$$y = -x^2$$



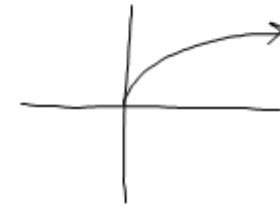
Stretch vertically  $y = 3x^2$



# Square root

general form

$$y = \pm a\sqrt{x-h} + k$$



move up 3  $y = \sqrt{x} + 3$

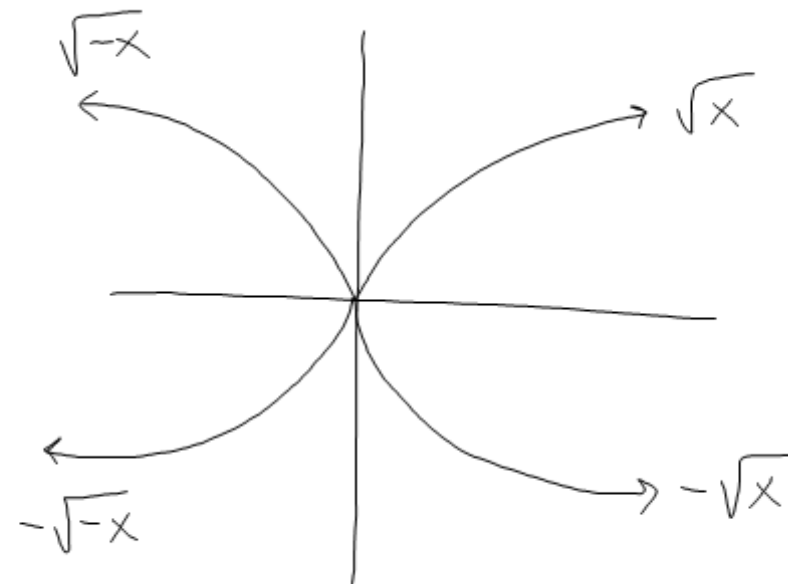
move down 3  $y = \sqrt{x} - 3$

move right 2  $y = \sqrt{x-2}$

move left 2  $y = \sqrt{x+2}$

reflections (see pict)

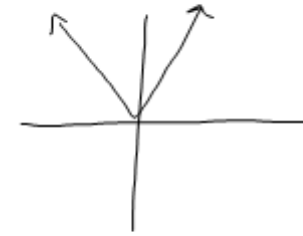
Stretch by 4  $y = 4\sqrt{x}$



# Absolute Value

general form

$$y = \pm a |x - h| + k$$



move up 3  $y = |x| + 3$

move down 3  $y = |x| - 3$

move right 2  $y = |x - 2|$

move left 2  $y = |x + 2|$

reflect over  
 $x \rightarrow -x$   $y = -|x|$

stretch by 4  $y = 4|x|$

# Semi Circle

general form  $y = \pm a \sqrt{1 - \left(\frac{x-h}{c}\right)^2} + k$

move up 3  $y = \sqrt{1-x^2} + 3$

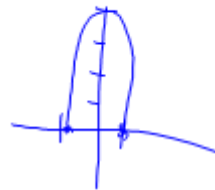
move down 3  $y = \sqrt{1-x^2} - 3$

move right 3  $y = \sqrt{1-(x-3)^2}$

move left 3  $y = \sqrt{1-(x+3)^2}$

reflect over  
x-axis  $y = -\sqrt{1-x^2}$

stretch vertically  
by 4  $y = 4\sqrt{1-x^2}$



Stretch horizontally  
by 2  $y = \sqrt{1-\left(\frac{x}{2}\right)^2}$

